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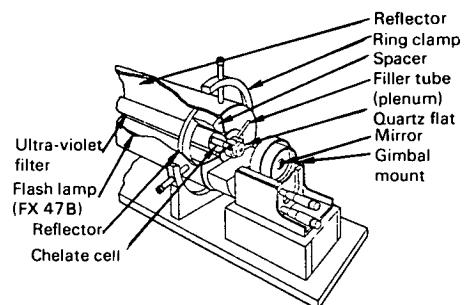
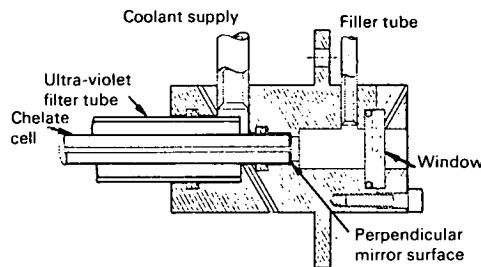
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NASA TECH BRIEF



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Liquid Laser Cavities



New liquid laser cavities have been developed in which the capillary cell is nearly three times longer than previously reported piston-type cells. These new cavities have plenum chambers at the ends of the cell which are terminated in transparent optical flats. The design allows the use of external confocal or plane mirrors and an accurate alignment. By use of these cavities, several new europium chelates and, for the first time, a terbium chelate can provide laser action in solution at room temperature.

Since the cell is terminated in a highly transmissive glass flat, conventional gimbal-mounted resonator mirrors can be used. The mirrors are external to the cavity, and the spacing radii of curvature and mirror coatings may be changed independent of the laser cavity or the cell. This arrangement permits selection of resonator configuration, e.g., hemispherical, confocal, Fabry-Pevot, with no disturbance to the laser cell. Lasing action has been obtained from a variety of europium and terbium chelates at room temperature, not possible using conventional piston cells.

The left figure shows the cell and window assembly. The cell is an 8-inch quartz tube with a 1-mm precision bore, having ends polished parallel to each other to within one second of arc and perpendicular to the

bore axis within one minute of arc. Perpendicularity is established using shadowgraph projection techniques and the mirrored end surfaces are used as reference planes for aligning the windows and resonator mirrors.

Three cavity designs have been used: a cylindrical cavity, and an elliptical cavity, both with linear flashlamps; and a cylindrical cavity with a coaxial flashlamp with the cell inside. The cylindrical cavity reflecting surface consists of a 10-cm id Pyrex cylinder, aluminized and overcoated with silicon monoxide and is shown in the right figure.

Notes:

1. All three cavities have been successfully used to demonstrate laser action at room temperature from several new europium chelates in solution, in addition to those previously reported.
2. No further documentation is available. Inquiries may be directed to:

Technology Utilization Officer
Goddard Space Flight Center
Greenbelt, Maryland 20771
Reference: B69-10234

(continued overleaf)

Patent status:

No patent action is contemplated by NASA.

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